## Remarks

Applicants respectfully request reconsideration of the present application in view of the above amendments and following remarks. Claims 11, 15, 20, 21, 29 and 31 have been amended. No claims have been added or cancelled. Therefore, claims 5-18, 20-22 and 26-31 are pending in the present patent application.

Claims 5-18, 20-22, 26-28 and 30 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,524,582 to Suh et al. ("the Suh reference"). Applicants respectfully traverse this rejection.

Independent claim 5 is directed to a method for fueling an internal combustion engine with a hydrocarbon fuel and a hydrogen-containing fuel gas. The method includes: a) starting the engine on a mixture of the fuel and the fuel gas wherein at least 90% of the motive energy of the engine is derived from the hydrogen-containing fuel gas; and b) progressively changing the supply ratio between the hydrocarbon fuel and the hydrogen-containing fuel gas such that, when the engine reaches an equilibrium operating temperature, an optimum fraction of the motive energy of the engine is derived from the hydrocarbon fuel and the hydrogen-containing fuel gas.

Applicants submit that the Suh reference does not teach or suggest a method for fueling an internal combustion engine comprising the step of, when the engine reaches an equilibrium operating temperature, an optimum fraction of the motive energy of the engine is derived from the hydrocarbon fuel and said hydrogen-containing fuel gas as recited in claim 5. In contrast, the two-phase fuel system set forth in the Suh reference operates to phase out the gaseous fuel supply and

become fully reliant on the liquid fuel supply (i.e., the hydrocarbon fuel) when the engine reaches a steady-state condition. *See Suh*, Col. 4, lines 54-64; FIGS. 2 and 3. In other words, the motive energy of the engine in the Suh reference is derived solely from hydrocarbon fuel at steady state operating conditions. The gaseous fuel supply mentioned in the Suh reference is not used in the steady state operation of the engine. This interpretation of the Suh reference is acknowledged and supported by the Examiner. *See Office Action mailed May 5, 2006* ("Office Action"), pgs. 2-3.

In the Office Action, the Examiner states that the term "optimum fraction" in claim 5 does not preclude the possibility of 0% hydrogen containing fuel gas in light of the limitations of dependent claim 15. First, Applicants would like to point out that claim 15 depends from independent claim 11, not independent claim 5. Second, Applicants submit that claim 15 has been amended to state that the amount of hydrocarbon fuel supplied to the engine is less than 100% at engine steady-state operating conditions. Therefore, the amount of hydrogen containing fuel gas would be greater than 0% at engine steady-state operating conditions.

Moreover, claim 5 states that the optimum fraction of the motive energy of the engine is derived from the hydrocarbon fuel and said hydrogen-containing fuel gas. Given the above claim language, the optimum fraction contains both hydrocarbon fuel and hydrogen-containing fuel gas when the engine reaches an equilibrium operating temperature. The Examiner's interpretation of claim 5 as including 0% hydrogen containing fuel gas is not supported by the claim language set forth therein. Given that the system in the Suh reference does not derive energy from both hydrocarbon fuel and said hydrogen-containing fuel gas at an equilibrium

operating temperature, Applicants submit that the Suh reference does not teach or suggest all of the limitations set forth in claim 5.

For at least these reasons, Applicants request that the rejection of claim 5 be withdrawn. As claims 6-10 depend from claim 5, these claims are also not taught or suggest by the Suh reference for at least the same reasons set forth with respect to claim 5. As such, Applicants request that the rejection of claims 6-10 be withdrawn.

Amended claim 11 is directed to a system for fueling an internal combustion engine with a hydrocarbon fuel and a hydrogen-containing fuel gas. The system includes a hydrocarbon fuel supply system and a hydrogen-containing fuel gas supply system. The engine is fueled at least 90% by the hydrogen-containing fuel gas at engine start-up and by an optimum mixture of the hydrocarbon fuel and the hydrogen-containing fuel gas at engine steady-state operating conditions.

For at least the same reasons set forth with respect to claim 5, the Suh reference does not teach or suggest a system for fueling an internal combustion engine wherein the engine is fueled at least 90% by the hydrogen-containing fuel gas at engine start-up and by an optimum mixture of the hydrocarbon fuel and the hydrogen-containing fuel gas at engine steady-state operating conditions as recited in claim 11. Applicants therefore request that the rejection of claim 11 be withdrawn. As claims 12-18 and 20 depend from claim 11, these claims are also not taught or suggested by the Suh reference for at least the same reasons set forth with respect to claim 11. As such, Applicants request that the rejection of claims 12-18 and 20 be withdrawn.

Amended claim 21 is directed to an internal combustion engine fueled by a hydrocarbon fuel and a hydrogen-containing fuel gas. The engine includes a hydrocarbon fuel supply system and a hydrogen-containing fuel gas supply system. The engine is fueled at least 90% by the hydrogen-containing fuel gas at engine start-up and by an optimum mixture of the hydrocarbon fuel and the hydrogen-containing fuel gas at engine steady-state operating conditions.

For at least the same reasons set forth with respect to claim 5, the Suh reference does not teach or suggest an internal combustion engine fueled at least 90% by the hydrogen-containing fuel gas at engine start-up and by an optimum mixture of the hydrocarbon fuel and the hydrogen-containing fuel gas at engine steady-state operating conditions as recited in claim 21. Applicants therefore request that the rejection of claim 21 be withdrawn. As claim 22 depends from claim 21, this claim is also not taught or suggested by the Suh reference for at least the same reasons set forth with respect to claim 21. As such, Applicants request that the rejection of claim 22 be withdrawn.

Claim 26 is directed to a method for fueling an internal combustion engine with a hydrocarbon fuel and a hydrogen-containing fuel gas. The method comprises the steps of: a) starting the engine on a mixture of the fuel and the fuel gas wherein at least 30% of the motive energy of the engine is derived from the hydrogen-containing fuel gas; and b) progressively changing the supply ratio between the hydrocarbon fuel and the hydrogen-containing fuel gas such that, when the engine reaches an equilibrium operating temperature, an optimum fraction of the motive

energy of the engine is derived from the hydrocarbon fuel and the hydrogen-containing fuel gas.

For at least the same reasons set forth with respect to claim 5, the Suh reference does not teach or suggest a method for fueling an internal combustion engine comprising the step of, when the engine reaches an equilibrium operating temperature, an optimum fraction of the motive energy of the engine is derived from the hydrocarbon fuel and said hydrogen-containing fuel gas as recited in claim 26. Applicants therefore request that the rejection of claim 26 be withdrawn. As claims 27, 28 and 30 depend from claim 26, these claims are also not taught or suggested by the Suh reference for at least the same reasons set forth with respect to claim 26. As such, Applicants request that the rejection of claims 27, 28 and 30 be withdrawn.

Claims 29 and 31 have been objected to as being dependent upon a rejected base claim, but the Examiner indicated that these claims would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims. As such, claims 29 and 31 have been rewritten in independent form to include all of the limitations of claim 26.

## Conclusion

In light of the foregoing, Applicants submit that claims 5-18, 20-22 and 26-31 are in condition for allowance and such allowance is respectfully requested. Should the Examiner feel that any unresolved issues remain in this case, the undersigned may be contacted at the telephone number listed below to arrange for an issue resolving conference.

The Commissioner is hereby authorized to charge the $400.00 fee for the two additional independent claims added to the application, and any other fee that may have been overlooked, to Deposit Account No. 10-0223.

Respectfully submitted,

Dated: 7/5/06

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